

# Proposed Revision of the Hydraulic Code Rules

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Habitat Program

# Overview

- Water crossings
  - Culverts
  - Bridges
  - Fords
- Fish passage structures
  - Fish ladders
  - Hydraulic designs
- Beaver dam management



# Water Crossings

Water crossings facilitate the movement of people or materials over water.

- Culverts
- Bridges
- Fords



# Regulatory History

1890 - Dams and obstructions must be passable to fish.

1950 – Highway culverts must also pass fish.

1994 – WAC included design criteria for water crossings



# Crossing Requirements

Crossings must be constructed to avoid or minimize impacts to fish and their habitat:

- Durable and efficient fish passage
- Preservation of in-stream habitat



# Passage and Habitat Standard

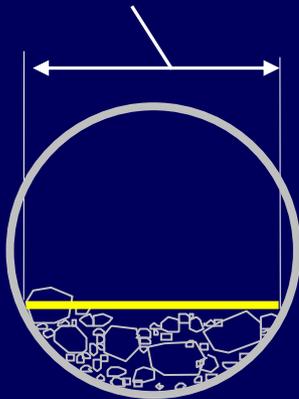
Because passage and habitat are required for all fish in all streams, culverts and bridges should simulate natural streams.



# Stream Simulation Culverts

1. Culvert at stream gradient

2. Culvert bed width equal to  $1.2 \times$  channel bed width + 2 ft. or alternative



3. Downstream countersink 30-50% of rise

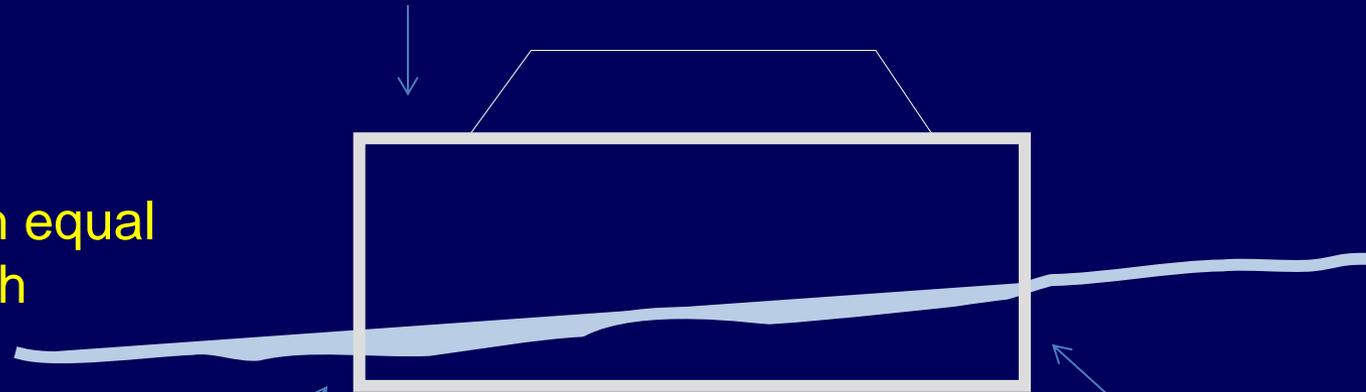
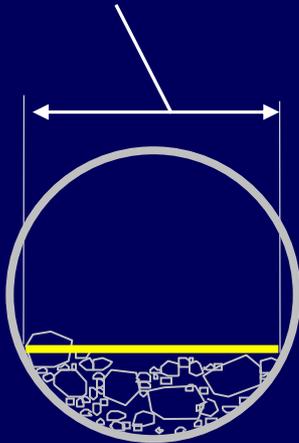
4. Upstream countersink 30-50% of rise

Requires complex engineering

# 'No Slope' Culverts

1. Culvert at **flat gradient**

2. Culvert bed width equal to channel bed width



3. Minimum **downstream countersink 20%** of rise

4. **Upstream countersink 40%** of rise maximum

Does not requires complex engineering

# Proposed W.C. WAC

## Major changes:

- Stream simulation culvert design method
- Bridge design for habitat protection
- Ford design provisions



# Proposed W.C. WAC

## 220-110-190:

- Uses stream simulation as the goal for design
- Provides design guidelines for culverts, bridges and fords
- Allows the designer freedom to choose methods and some criteria



# Fishways



Fishways are designed specifically to pass certain fish  
– mostly adult salmon and trout

# Fishway Applications

- Temporary passage
- Passage at an existing barrier
- Roughened channel



# Fishway Design

- Engineers stamp required
- Must meet specific criteria
- Must be inspected and maintained



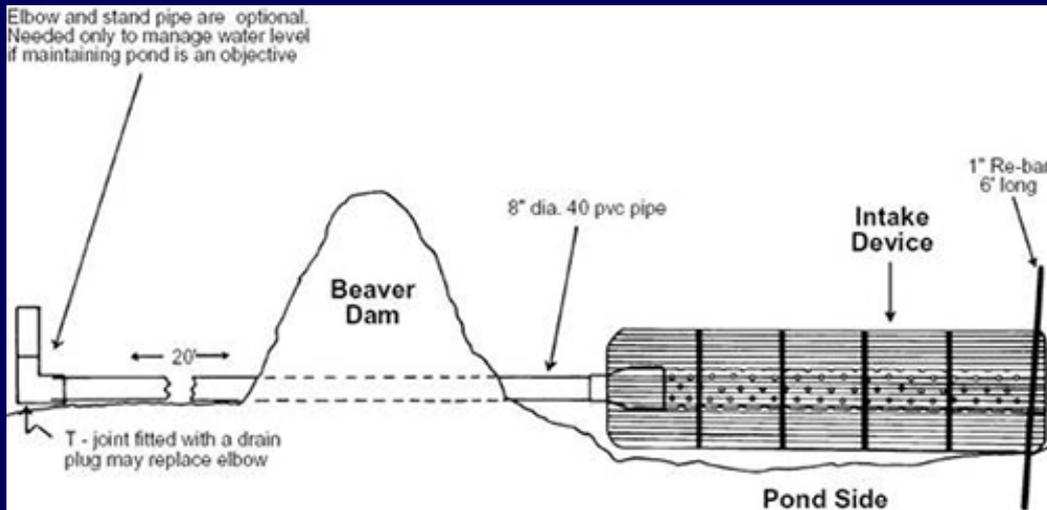
# Beaver Dam Management

## Types of Activities

- Dam removal or breaching
- Water level control devices
- Beaver exclusion devices



# Water Level Control Device



Clemson Beaver Pond Leveler



# Beaver Exclusion Device



Stillaguamish Tribe Beaver Defeater



Trapezoidal Fence

# Potential Impacts from Beaver Dam Management

## Fish life concerns

- Loss of fish habitat
  - Coho
  - Olympic mudminnow
- Impacts to water quality
  - Water storage
  - Sediment storage



# Rules for Beaver Dam Management

## Provisions

- Dam removal
  - Remove only to prevent damage
  - Control sediment and water release
- Water level control and exclusion
  - Provide fish passage



# March Meeting

## Saltwater Sections

- Authorized work times
- Residential docks
- Outfalls and tide gates
- Boring



# Contact Information

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